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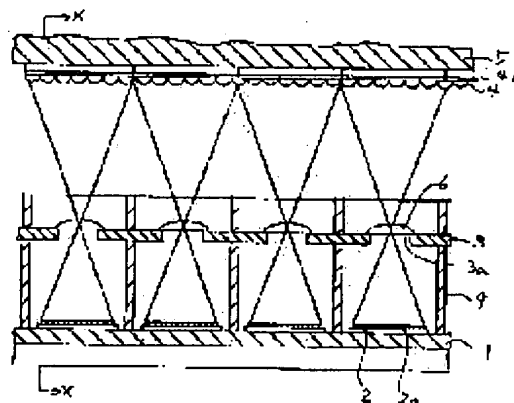
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(54) IMAGE FORMING DEVICE

(57)Abstract:

PURPOSE: To provide a small image forming device which can form a clear and accurate latent image on a sensitive film by registering completely positions of lenses supported on a lens plate and positions of pixel arrays placed on a base plate, converting light passing through respective lenses into parallel light and deepening the depth of focus.

CONSTITUTION: A device consists of a lens plate 3 on which a plurality of lenses 6 are disposed and supported in the straight line shape at the given intervals, and a base plate 1 on which a number of pixel arrays 2 are disposed and placed in the straight line shape, and the lens plate 3 and the base plate 1 are combinedly fixed in a manner of making respective lenses 5 and respective pixel arrays 4 corresponding one-to-one. The thermal expansivity of the lens plate 3 supporting the lenses 6 and the expansivity of the base plate 1 on which pixel arrays 2 are placed are made substantially same, and microlens arrays 4a consisting of a plurality of microlenses 4 arranged in the straight line shape are disposed on the lens plate 3.



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CLAIMS

[Claim(s)]

[Claim 1] The lens plate which carried out array support of two or more lenses at the predetermined spacing at the shape of a straight line, Many picture element arrays change from the base plate by which array installation was carried out to the shape of a straight line. Each lens and each picture element array are said lens plate and base plate 1 Pair 1 It is image formation equipment made to put side by side so that it may correspond. Image formation equipment characterized by allotting the micro-lens array which made two or more micro lenses arrange in the shape of a straight line on a lens plate while making the same substantially the coefficient of thermal expansion of the lens plate which supports said lens, and the base plate with which a picture element array is laid.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the image formation equipment used as the light source of an electro-photographic printer.

[0002]

[Description of the Prior Art] Recently, the kanji and graphic form of arbitration are demanded of high speed and the cheap electro-photographic printer which can be outputted with high quality and in large quantities small in the regular paper with progress of communication technology at the information-processor technical list. Therefore, the electro-photographic printer which used the image formation equipment which carries out array loading of two or more light emitting diode components at the shape of a straight line, and grows into one principal plane of an electric insulation substrate as the light source of a printer that this demand should be coped with is proposed as a thing of small and high resolution.

[0003] The lens plate with which the image formation equipment currently used for this conventional electro-photographic printer usually changes from resin, such as a polycarbonate which carried out array support of two or more lenses at the predetermined spacing at the shape of a straight line, to a base material, Each lens and each light emitting diode component array are the base plate with which many light emitting diode component arrays change from the nature sintered compact of an aluminum oxide by which array installation was carried out, glass, etc. to the shape of a straight line 1 Pair 1 It has the structure made to put side by side so that it may correspond. While making an external electrical signal correspond and making the light emitting diode component of each light emitting diode component array emit light alternatively separately An external photo conductor side is made to carry out exposure image formation of the light in which this each light emitting diode component emitted light through a lens, and it functions as the light source of an electro-photographic printer by making a latent image form in a photo conductor.

[0004] In addition, when 64 light emitting diode components are arranged in the shape of a straight line by the shape of a straight line, the light emitting diode component array by which array installation is carried out is generally constituted in the interior and it uses it as the light source of the electro-photographic printer of B4 size on said base plate, for said light emitting diode component array, the 32 pieces are each to each lens 1 Pair 1 As it corresponds, it will be laid on a base plate.

[0005] Moreover, since it becomes improper [each light emitting diode component array laid in each lens supported by said lens plate and a base plate generates a blot, a white stripe, a black stripe, etc. in the image by which image formation is carried out to a photo conductor side and is clear if gap occurs in the both location, and] to form an exact latent image, it is necessary to carry out alignment very with high precision [each lens and each light emitting diode component array].

[0006]

[Problem(s) to be Solved by the Invention] The coefficient of thermal expansion of the lens plate which consists of resin, such as a polycarbonate which supports a lens in this conventional image formation equipment, and the base plate which consists of the nature sintered compact of an aluminum oxide with which a light emitting diode component array is laid, glass, etc. however, respectively They are $1.9 \times 10^{-5}/^{\circ}\text{C}$ and $4.0 - 7.5 \times 10^{-6}/^{\circ}\text{C}$. Since it is greatly different, when using it as the light source of an electro-photographic printer, If heat is impressed to both lens plate and base plate, a lens plate will carry out thermal expansion greatly compared with a base plate. Consequently, location gap was produced between the lens supported by the lens plate and the light emitting diode component array laid in a base plate, and it had the fault that a clear and

exact latent image could not be formed in a photo conductor side.

[0007] Moreover, the focal distance of each lens which conventional image formation equipment was made to correspond to the miniaturization of an electro-photographic printer, and was supported by the lens plate is made with the short thing. In the image by which image formation will be carried out to a photo conductor side if some location gap occurs in the installation location to the distance of a lens plate and a photo conductor side, and the base plate of a light emitting diode component array etc., easily Therefore, a blot and a white stripe, It also had the fault which becomes a black stripe etc. occurs, consequently it is clear to a photo conductor, and improper [forming an exact latent image].

[0008]

[Objects of the Invention] This invention was thought out in view of the above-mentioned fault, the purpose changes into parallel light the light which passes each lens, and makes the depth of focus deep while it makes perfect alignment of the lens supported by the lens plate and the picture element array laid in a base plate, and it is in offering the small image formation equipment which can form an exact latent image in a photo conductor vividly.

[0009]

[Means for Solving the Problem] The lens plate with which this invention carried out array support of two or more lenses at the predetermined spacing at the shape of a straight line, Many picture element arrays change from the base plate by which array installation was carried out to the shape of a straight line. Each lens and each picture element array are said lens plate and base plate 1 to 1 It is image formation equipment made to put side by side so that it may correspond. While making the same substantially the coefficient of thermal expansion of the lens plate which supports said lens, and the base plate with which a picture element array is laid, it is characterized by allotting the micro-lens array which made two or more micro lenses arrange in the shape of a straight line on a lens plate.

[0010]

[Function] Since according to the image formation equipment of this invention the coefficient of thermal expansion of the lens plate which supports a lens, and the base plate with which picture element arrays, such as a light emitting diode component array, are laid was substantially made as it is the same, even if heat is impressed to both lens plate and base plate A lens plate and a base plate carry out thermal expansion only of the amount of abbreviation identitas. The result, Image formation of the light which location gap does not generate in the location of each lens and each light emitting diode component array, and each light emitting diode component emits is correctly carried out to a photo conductor side through a lens, and it becomes possible to form an exact latent image in a photo conductor vividly.

[0011] Moreover, the light of a light emitting diode component which passed each lens since the micro-lens array which made two or more micro lenses arrange in the shape of a straight line on a lens plate was allotted becomes close to parallel light by the micro lens, and the depth of focus changes deeply. Consequently, even if some location gap occurs in the installation location to the distance of a lens plate and a photo conductor side, and the base plate of a light emitting diode component array etc., a photo conductor side can be made to carry out image formation of the light which a light emitting diode component emits correctly. It is clear to a photo conductor and this enables it to form an exact latent image.

[0012]

[Example] Next, this invention is explained to a detail based on an accompanying drawing. Drawing 1 And drawing 2 One example of the image formation equipment of this invention is shown, and it is 1. A base plate and 2 A light emitting diode component array and 3 A lens plate and 4 It is a micro lens.

[0013] Said base plate 1 It consists of electrical insulation materials, such as a glass epoxy resin, and is the light emitting diode component array 2 of plurality [top face / the]. Array installation is carried out at the shape of a straight line.

[0014] Said base plate 1 Light emitting diode component array 2 The epoxy resin which acted as supporter material to support, for example, was made into the shape of a sol into the glass fiber is slushed, and it is manufactured by carrying out heat curing of said epoxy resin after an appropriate time.

[0015] Moreover, said base plate 1 Light emitting diode component array 2 which turns array installation up It is the external photo conductor 5 about the light which it consisted of two or more light emitting diode component 2a, and this light emitting diode component 2a emitted light alternatively separately corresponding to the external electrical signal, and emitted light. It is a photo conductor 5 by irradiating a front face. The latent image for forming an image is formed.

[0016] Said light emitting diode component 2a is GaAsP. A system and GaP The light emitting diode of a system is used, for example, it is GaAsP. In being the light emitting diode of a system While heating the substrate of GaAs to an elevated temperature all over a furnace first, it is AsH₃ (arsine). PH₃ (HOSUHN) Ga (gallium) The gas included in optimum dose is contacted and it is n to a substrate front face. GaAsP of a mold semi-conductor (gallium arsenic-phosphorus) A single crystal is grown up. Next, GaAsP It is Si₃N₄ (silicon nitride) to a single crystal front face. While making ***** put, it is Zn (zinc) to this window part. Gas is exposed. n GaAsP of a mold semi-conductor Some single crystals are made to diffuse Zn and it is p. A mold semi-conductor is formed and it is formed by giving pn junction.

[0017] In addition, in the case of the electro-photographic printer of B4 size, said light emitting diode component 2a is 2048 pieces (per [8] mm individual). It is the light emitting diode component array 2 which is arranged in the shape of a straight line, and specifically made one unit 64 light emitting diode component 2a. 2048 light emitting diode component 2a is a base plate 1 by arranging 32 pieces and in the shape of a straight line. It is arranged upwards.

[0018] Moreover, said light emitting diode component array 2 Laid base plate 1 Fixed distance is separated in the upper part, and it is the lens plate 3. It is a lens 6 as hole 3a is closed, while being annexed and carrying out array formation of two or more hole 3a on this lens plate 3 at the shape of a straight line. Adhesion immobilization is carried out through binders, such as resin.

[0019] Said lens plate 3 Two or more lenses 6 Acting [and] as supporter material supported at the predetermined spacing, hole 3a is the light emitting diode component array 2. It is a lens 6 about the light which each light emitting diode component 2a emits. It succeeds in the operation which makes it penetrate.

[0020] Said lens plate 3 For example, light emitting diode component arrays 2, such as a glass epoxy resin Base plate 1 laid The coefficient of thermal expansion is substantially formed with the same quality of the material. Lens plate 3 A coefficient of thermal expansion is a base plate 1. Since it was substantially the same, when it is used as the light source of an electro-photographic printer with a coefficient of thermal expansion, lens plate 3 Base plate 1 even if heat is impressed to both -- lens plate 3 Base plate 1 abbreviation -- the same amount -- thermal expansion -- carrying out -- each lens 6 Each light emitting diode component array 2 Location gap does not occur [consequently] in between. The light which each light emitting diode component 2a emits is a lens 6. It minds and is a photo conductor 5. Image formation is carried out to a field correctly and vividly, and it is the photo conductor film 6. It becomes possible to make the latent image of high quality form.

[0021] Moreover, said lens plate 3 Each supported lens 6 It is a photo conductor 5 about the light which each light emitting diode component 2a emits. It succeeds in the operation which carries out exposure image formation, and the lens formed with transparence inorganic substances, such as transparence resin, such as acrylic resin and polycarbonate resin, or glass, is used suitably.

[0022] In addition, said each lens 6 Adhesives, such as resin, are minded for a part of the outside surface, and it is the lens plate 3. It is the lens plate 3 by pasting up. It has pasted up in the shape of a straight line at intervals of predetermined.

[0023] Moreover, said light emitting diode component array 2 Laid base plate 1 And lens 6 Lens plate 3 currently supported The base material 7 of the pair which consists the each of a glass epoxy resin etc., and 7 It is each light emitting diode component array 2 by making it join. Each lens 6 Predetermined distance ***** 1 Pair 1 It is annexed so that it may correspond.

[0024] The base material 7 of said pair, and 7 It is the 1st to the CHUBU ENGINEERING CORPORATION. It is datum-level 7a to the lower part The 2nd It has datum-level 7b. A base material 7 and 7 The 1st It is the lens plate 3 to datum-level 7a. The inferior-surface-of-tongue periphery section A base material 7 and 7 The 2nd It is a base plate 1 to datum-plane 7b. It is each light emitting diode component array 2 by carrying out contact immobilization of the top-face periphery section. Each lens 6 Predetermined distance is separated in between and it is 1. Pair 1 It corresponds.

[0025] Furthermore, the base material 7 of said pair and 7 Two or more micro lenses [upper part] 4 Micro-lens array 4a arranged in the shape of a straight line is allotted.

[0026] Said micro-lens array 4a is the photo conductor 5 of light emitting diode component 2a. When an optical exposure is set to 300dpi, 84.6 micrometers Two or more micro lenses 4 in a pitch Make it arrange in the shape of a straight line, and it changes. Each micro lens 4 of this micro-lens array 4a Each lens 6 Amendment which changes the optical path of the light of passing light emitting diode component 2a into the thing near parallel light is performed. Each micro lens 4 The depth of focus will become deep and the amended light is the lens plate 3. Photo conductor 5 Distance, light emitting diode component array 2 Base plate 1 even if some location

gap occurs in an installation location etc. -- photo conductor 5 **** -- the light which light emitting diode component 2a emits carries out image formation correctly -- having -- consequently, photo conductor 5 It becomes possible to form an exact latent image vividly.

[0027] in addition, said micro-lens array 4a consists of acrylic resin, PMMA (polymethylmethacrylate), BORIKABONETO resin, etc., and is manufactured by adopting a well-known injection-molding method etc. conventionally -- having -- the base material 7 of a pair, and 7 carrying out adhesion immobilization through the suitable binder for the upper part -- lens 6 Photo conductor 5 between -- and photo conductor 5 It is allotted to near.

[0028] According to the image formation equipment of this invention in this way, it is a base plate 1. Light emitting diode component array 2 currently laid in the shape of a straight line upwards Predetermined power is made to impress to each light emitting diode component 2a. It is a lens 6 about the light in which this each light emitting diode component 2a emitted light while making each light emitting diode component 2a emit light alternatively according to an individual. And micro lens 4 It minds and is a photo conductor 5. It functions as image formation equipment by carrying out exposure image formation.

[0029] In addition, this invention is a base plate 1 at the above-mentioned example in which various modification is possible, if it is the range which is limited to an above-mentioned example and does not deviate not from a thing but from the summary of this invention. Lens plate 3 Although both were formed with the glass epoxy resin Base plate 1 Lens plate 3 Any ingredients can be used if it is the ingredient with which the both coefficient of thermal expansion becomes the same substantially. Base plate 1 In case it consists of a glass epoxy resin, it is the lens plate 3. Besides a glass epoxy resin, glass fiber strengthening nylon, glass fiber strengthening polyphenylene sulfide resin, and glass fiber strengthening acrylonitrile-butadiene-styrene copolymer, Or you may be the ingredient which carried out selection mixing of at least two sorts in these ingredients.

[0030] Moreover, said base plate 1 Lens plate 3 Light emitting diode component array 2 which is in between and adjoins It is a gobo 9 in between. If it allots Each light emitting diode component array 2 Even if the light which light emitting diode component 2a emits tends to leak to the adjoining light emitting diode component array 2 side, the leakage is said gobo 9. It is intercepted completely. Consequently, each light emitting diode component array 2 The light which light emitting diode component 2a emits is 1 to it. Lens 6 which corresponds by pair 1 And micro lens 4 Only by minding, it is a photo conductor 5. Exposure image formation is carried out. photo conductor 5 **** -- the blot by the exposure of an unnecessary light etc. becomes that there is nothing, and it becomes possible to form a very clear latent image. Therefore, said base plate 1 Lens plate 3 Light emitting diode component array 2 which is in between and adjoins In between, it is a gobo 9. Allotting is desirable.

[0031] [Effect of the Invention] Since according to the image formation equipment of this invention the coefficient of thermal expansion of the lens plate which supports a lens, and the base plate with which picture element arrays, such as a light emitting diode component array, are laid was substantially made as it is the same, even if heat is impressed to both lens plate and base plate A lens plate and a base plate carry out thermal expansion only of the amount of abbreviation identitas. The result, Image formation of the light which location gap does not generate in the location of each lens and each light emitting diode component array, and each light emitting diode component emits is correctly carried out to a photo conductor side through a lens, and it becomes possible to form an exact latent image in a photo conductor vividly.

[0032] Moreover, the light of a light emitting diode component which passed each lens since the micro-lens array which made two or more micro lenses arrange in the shape of a straight line on a lens plate was allotted becomes close to parallel light by the micro lens, and the depth of focus changes deeply. Consequently, even if some location gap occurs in the installation location to the distance of a lens plate and a photo conductor side, and the base plate of a light emitting diode component array etc., a photo conductor side can be made to carry out image formation of the light which a light emitting diode component emits correctly. It is clear to a photo conductor and this enables it to form an exact latent image.

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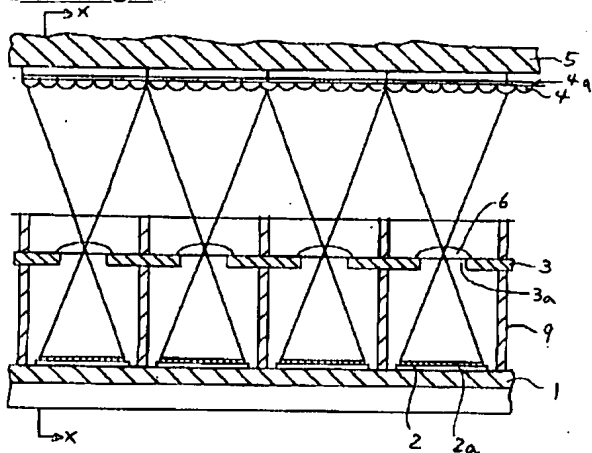
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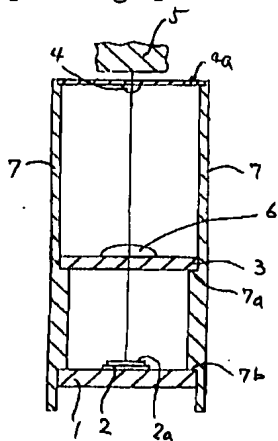
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DRAWINGS

[Drawing 1]



[Drawing 2]



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